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Laid Open Patent No. 57-30639.- - -

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(54) Title of the Invention :

Glare-prevention Mirror Device

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SPECIFICATION

1. Title of the Invention

Glare-prevention Mirror Device

2. What we claim is :

1. A glare prevention mirror device characterized consisting of a reflecting mirror in which an electrochromic mirror is inserted between mutually opposing transparent electrodes respectively provided with a sheet of transparent glass on the respective outer surface and a highly reflecting surface is formed on one of the above-mentioned sheets of transparent glass or one of the above-mentioned transparent electrodes, and a drive circuit which is constituted by provided a switch device and a timer device between the transparent electrode of the above-mentioned reflecting mirror and a drive power source

which applies a voltage or a current to the above-mentioned electro-chromic substance.

2. An glare prevention mirror device, in accordance with Claim 1, characterized by the fact that the above-mentioned drive circuit is provided with an adjusting device for voltage or current.

3. Detailed Explanation of the Invention

The present invention relates to a glare prevention mirror device which prevents glaring by a reflected light from a mirror surface, especially a glare prevention mirror device for an automobile.

As for a conventional glare prevention mirror device, mentioned may be made of a glare prevention mirror device by a so-called prism mirror in which, as shown in fig. 1, there are provided 2 reflecting surfaces having different reflective indices and a glare prevention effect can be obtained by using a reflecting surface of a higher reflective index (a) during day and a reflecting surface of a lower reflective index at night through the switching of them, or a so-called liquid crystal mirror which has a structure, as shown in fig. 2, in which a liquid crystal (c) as a substance whose light transmissivity may change is inserted between a transparent electrode (d) formed on a sheet of transparent glass (f) and a highly reflective electrode (e). This mirror uses a method in which when a

light ray from a light source such as a headlight from a following car is reflected to an excess extent, the reflective index is reduced either manually or automatically by an electric means such as the applying of a voltage to between electrodes, thereby achieving a glare prevention effect, and thus applies a phenomenon of reducing the light transmissivity through the random light scattering effect of a liquid crystal.

However, in the case of the former structure, there are defects in that it is required to change an angle of a mirror by a mechanical means through a manual operation while driving a car, and that since the 2 reflecting surfaces are not parallel to each other, a reflected image in the field of vision in the rear can be seen as a double image, it is extremely difficult to see while driving during day or at night. On the other hand, in the case of the latter case, since the glare prevention effect is achieved through a random light scattering effect of a liquid crystal at the time of driving, a reflected image from a highly reflecting surface becomes a highly smeared image, thus it has been extremely poor in recognition of an image by seeing, and in reality, the visual recognition by this has been as poor as the visual recognition of the field of vision in the rear by a prism mirror of an extremely low reflective index. Furthermore, since a glare prevention mirror which uses a liquid crystal

utilizes a liquid crystal of an electric field effect type, it has been difficult to vary the reflective index either in a continuous manner or in a stepless but discontinuous manner, and it has been necessary to take a certain type of an on-off drive.

Therefore, in a case in which one drives a car at night while maintaining the glare prevention effect by setting the reflective index at a certain level, it is hardly possible to recognize the situation around the car excepting a headlight of a following car and is difficult to confirm safety in the rear, and thus since it is extremely dangerous, it is not appropriate for continuous use during driving at night. That is, since the recognizability of the rear is poor, it has happened that one avoids the use of the reflective index at which there is a glare prevention effect or that one often performs the operation, and therefore, it has been often inconvenient for a driver.

The present invention is to provide a glare prevention mirror which has eliminated such conventional defects as mentioned above and is extremely effective.

In the following, we shall explain the present invention by referring to some examples embodying the present invention.

Fig. 3 shows an obliquely seen view of a glare prevention mirror assembly in accordance with the present invention.

Fig. 4 is a cross sectional view thereof, and Fig. 5 is a block diagram of a first example embodying the present invention.

As shown in Fig. 3 and Fig. 4, the reflecting mirror in accordance with the present invention is made as follows : one surface each of the transparent glass sheets 1 and 1' is coated with Fn_2O_3 (sic), or SnO_2 by a deposition process, etc., thereby preparing transparent electrodes 5 and 5', and furthermore a highly reflective surface 6 is formed by depositing Ag or Al on the back surface of the above-mentioned deposition surface of the transparent glass sheet 1' at the back surface of the reflecting mirror (when seen from the side of the incident light ray).

Lead wires 4 and 4' which are connected to a drive circuit A are connected to the above-mentioned transparent electrodes 5 and 5'. The transparent glass sheets 1 and 1' on which the transparent electrodes 5 and 5' as mentioned above are formed are arranged in such a manner that the above-mentioned transparent electrodes may face each other, and are allowed to be stacked on each other with spacers 2 formed with a glass sheet or a high molecular weight film, etc. being sandwiched at the outer peripheral ends thereof. At this time, the spacers 2 are adhered to and fixed to the above-mentioned transparent electrodes 5 and 5' with an adhesive such as an epoxy series adhesive, a nylon series adhesive, and a poly

ester series adhesive, by leaving an injection opening 3 for an electro-chromic substance. Thereafter, an electro-chromic substance is poured into a gap formed by the above-mentioned transparent electrodes 5 and 5' and the above-mentioned spacers 2, and then the injection opening 3 is sealed with the above-mentioned adhesive again, thereby manufacturing an glare prevention mirror.

In this case, as to an electro-chromic substance to be injected therein, it is not limited only to a single material only but one constituted with a plurality of materials is permissible, as long as it shows an electro-chromic phenomenon in which the light transmissivity may vary from a transparent state to a state of a range from 0 to about 70 % when a voltage or a current is applied thereto, and for example, it is possible to use a so-called liquid electro-chromic material such as a 1 - 1' dialkyl 4 - 4' pyridinium compound and a derivative thereof or a solution of the compound dissolved in water or a non-aqueous solvent. As a representative example of the above-mentioned compounds, we may mention a halogen compound in which the carbon number of an alkyl group is 1 to 9. In addition, as other electro-chromic substances, use may be made of a so-called semi-solid electro-chromic substance which is made of a metal oxide such as WO_3 (tungsten trioxide), MoO_3 (molybdenum trioxide), and TiO_2 (titanium dioxide) and sulfuric acid and propylene

carbonate or thilium (sic) perchlorate and a liquid electrolytic material such as acyno (sic) silane, as constituting materials, or a solid electro-chromic substance which is made of the a metal oxides as mentioned above and a derivative or a solid electrolytic substance such as CaF_2 (calcium fluoride), Cr_2O_3 (chrome oxide), SiO (silicon oxide), SiO_2 (silicon dioxide), and MgF_2 (magnesium fluoride), as constituting materials. The lead wires 4 and 4' which are connected to the transparent electrodes 5 and 5' of a reflecting mirror constituted as mentioned above, are connected to output terminal sections of a switch device 8, as shown in Fig. 5, and furthermore, a drive circuit which is connected to a drive power source 10 which outputs a DC voltage to apply a pre-determined current or voltage in order to change the light transmissivity of the reflecting mirror, is connected to the input terminal sections of the switch device 8 through a timer device 9. And the above-mentioned switch device 8 has two or more circuits as its functions, and can be inverted depending on plus or minus of the DC output (voltage) from the drive power source 10. In a case in which the light transmissivity of an electro-chromic substance is reduced at this time, there is provided the switch device 8 in such a manner that the lead wire 4 connected to the transparent electrode 5 may be connected to the minus side of the drive power source 10. Although

the timer device 9 is placed between the switch device 8 and the drive power source 10 in Fig. 3, it is also possible to arrange them in a reverse manner. That is, depending on a type of an electro-chromic substance, etc., it may be placed at an arbitrary position between the reflecting mirror and the drive power source 10. In addition, it is appropriate to use a timer device which has such a closing and opening function that it may be controlled in a rather high range of 0 to 120 seconds.

Fig. 6 shows another example of a reflecting mirror embodying the present invention : a highly reflective surface having electric conductivity made of Ag (silver) or Al (aluminum), etc., is formed on one surface of a transparent glass plate 1' by a deposition process, etc., and this is formed as a reflecting electrode 12 which plays a role of an opposing electrode of the transparent electrode 5 and a role of a highly reflective surface.

Fig. 7 is a drawing which shows another example of a drive circuit : it has such a configuration that there may be provided a switch device 8, a timer device 9 and a voltage adjusting device (for example, a device which has a function of volume, etc.) in this sequence from the side of a reflecting mirror between the reflecting mirror and a drive power source 10. However, it is also possible to change the above -mentioned arrangement of the devices in any order as long as they are placed between the reflecting

mirror and the drive power source 10.

Therefore, with the glare prevention mirror device in accordance with the present invention, if the switch device 8 is operated to be connected to between the input terminal sections, the glaring light from a headlight, etc. of a following car may be reduced in strength because the electro-chromic substance placed between both electrodes reduces the light transmissivity and consequently the light reflected on the highly reflective surface 6 is reduced depending on a pre-determined voltage or current applied. If the timer device 9 is operated at same time, it is possible to obtain the light reduction effect for a certain period of time. In addition, in a case in which a voltage adjusting device 11 is placed in the drive circuit, it becomes possible to set a pre-determined output from the drive power source in a stepless, continuous manner (or in a discontinuous manner) through the operation of the above-mentioned device, the voltage or current to be applied to the electrodes 5 and 5' is adjusted accordingly, therefore the light transmissivity of the electro-chromic substance is adjusted, and the light reflected on the highly reflective surface 6 can be changed in a stepless, continuous manner (or in a discontinuous manner), adjusted and set.

In a case in which one wants to bring back the above-mentioned electro-chromic substance 7 to an almost

transparent state in which light transmissivity thereof becomes to assume a value prior to the driving, it can be achieved either by cutting of the connection between the input and output terminals through the operation of the switch device 8 or by applying a voltage or a current in the direction opposite to the time when the light transmissivity is reduced, to between the transparent electrodes 5 and 5' through the operation of the switch device 8 together with the timer device 9 only for a timer control time. If the voltage adjusting device 11 is used at this time, it is possible to allow the electro-chromic substance to return to the original state in a continuous manner or in a discontinuous manner.

Since the present invention has the constitution and actions as mentioned above, a pre-determined voltage or current and reflected light corresponding to this and time are obtained in a stepless, continuous or discontinuous manner through the operation of the switch device 8 and the combined use of the timer device 9 or the voltage adjusting device 11, and therefore it does not happen that the light reflective index becomes extremely low and an appropriate glare prevention effect can be thus achieved, and furthermore since an electro-chromic substance is a substance which reduces the light transmissivity due to the light absorption effect when a voltage or a current is applied thereto, and furthermore since an image reflected

by the highly reflecting surface 6 is seen both at the time of driving and at the time when it is not driven, a smeared image or a double image hardly occurs, it is possible to maintain a light reflective index which provides good recognizability of the rear view and it is excellent in rear safety confirmation during running at night.

Furthermore, since this glare prevention mirror device is driven electrically, the switch device 8, etc. can be installed in a room mirror or in the neighborhood of the attaching position of a room mirror, and if they are installed in an instrument panel or in the neighborhood thereof, it becomes possible to reduce the burden of operations by an operator.

In addition, if the glare prevention mirror device is constituted in such a manner that the said glare prevention mirror device may be automatically driven at the time of lighting in conjunction with a lighting switch of a headlight of an automobile, it becomes possible to eliminate an independent operation of the switch device 8 and furthermore it does not happen that the functions of the glare prevention mirror device are not utilized due to it that an operator forgets to operate the said switch device 8.

And furthermore, since the structure of the glare prevention mirror device is extremely simple, it has

effects that the manufacturing facilities, etc. can also be of a small scale, the production cost can be reduced, the maintenance is easy and simple, and the frequency of troubles is small.

In addition, it is a matter of course that the present invention is not limited only to the above-mentioned examples embodying the present invention.

4. Simple Explanation of the Drawings

Fig. 1 and Fig. 2 are drawings which show conventional glare prevention mirrors. Fig. 3 is an obliquely seen view of a glare prevention mirror assembly in accordance with the present invention, Fig. 4 is a cross sectional view thereof, and Fig. 5 is a drawing which shows one example of a drive circuit in accordance with the present invention. Fig. 6 is a cross sectional view which shows another example of a reflecting mirror in accordance with the present invention, and Fig. 7 is a drawing which shows another example of a drive circuit in accordance with the present invention.

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Fig. 1

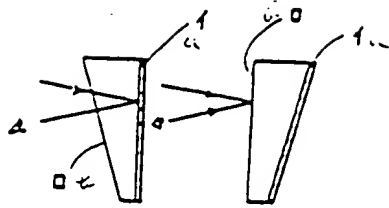


Fig. 2

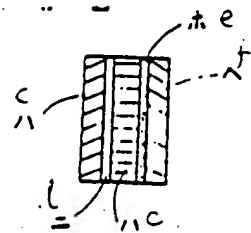


Fig. 3

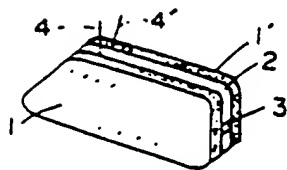


Fig. 4

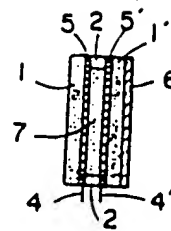
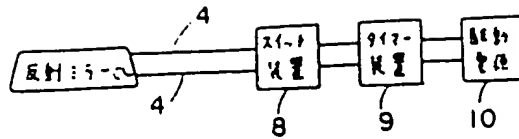


Fig. 5



key a.

reflecting mirror

8. switch device

9. timer device,

10. drive power
source

Fig. 6

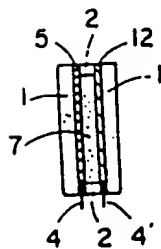
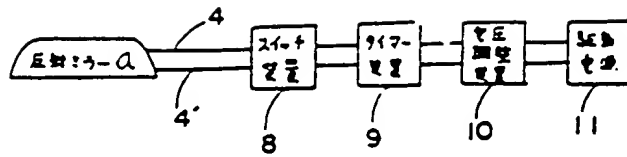


Fig. 7



a. reflecting
mirror, 8.
switch device,
9. timer device
10. voltage
adjusting device
11. drive power
source

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⑩ 公開特許公報 (A)

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審査請求 未請求

(全 5 頁)

⑭ 防眩ミラー装置

⑮ 特 願 昭55-104305
⑯ 出 願 昭55(1980)7月31日
⑰ 発 明 者 根岸征

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明 細 書

発明の名称 防眩ミラー装置

特許請求の範囲

1. 外面に透明ガラスを備えた前向する透明電極間にエレクトロクロミックを挿入し、前記前向する一面の透明ガラス又は透明電極に高反射面を形成してなる反射ミラーと、前記反射ミラーの透明電極と、前記エレクトロクロミック物質に電圧又は電流を加える駆動電線との間にスイッチ装置と、イマー装置とを設けてなる駆動回路とよりなることを特徴とする防眩ミラー装置。

2. 前記駆動回路に電圧又は電流の調整装置を備えたことを特徴とする特許請求の範囲第1項記載の防眩ミラー装置。

発明の詳細な説明

本発明は、ミラー端面の反射光による眩惑を防止した防眩ミラー装置とくに自動車用の防眩ミラー装置に関するものである。

従来の防眩ミラー装置は、第1図に示したような、反射面の異なる2つの反射面を設け、これを

後方間で切替えることによつて片は裏反射面即ち低反射面を用いて防眩効果を導く一方はプリズムミラーによる防眩ミラー装置や、あるいは第2図の如く透光性を有する電極として電極間に透明ガラス間に形成した透明電極の間に形成した高反射の防眩ミラー、いわゆる液晶ミラーがある。このミラーは電圧等を加えるなど電気的な制御によつて後方視界のヘッドライトなどの光源からの光線が過度に反射された時、液晶ミラーの透光性を手動又は自動的に減少させて防眩を行う方法であり、液晶の光散乱効果による光透過率の低下現象を利用したものである。

しかしながら、前者の構造の場合には、走行に応じて手で機械的にミラーの角度を変える必要があり、しかも2つの平行でない反射面であるため、後方視界の反射像は重複で見えるため昼夜間の走行中非常に見苦しい欠点があった。又後者の場合には、駆動時の液晶の光散乱効果によつて防眩効果を生じせしめるため、高反射面からの反射像は

著しいニツト値となり、透過性が非常に悪く、事實上は極端に反射率の低いプリズムミラーの低反射面による後方視界の透過性と同等度でもつた。更に液晶を用いた防眩ミラーでは電界効果型液晶を用いるため、反射率の無段階不連続的又は連続的な変化を行うことは困難であり、ある一定のON-OFF型駆動を要用しなければならなかつた。

この為、防眩効果のある反射率を保持したまま夜間走行した場合に後視車のヘッドライト以外の周囲の状況の確認がほとんど出来ずに後方の安全確認が困難であり、きわめて危険なため夜間走行中の連続使用に適さなかつた。即ち後方透過性が悪いため防眩効果のある反射率の使用をさけたり、操作を度々行つたりし、運転者に不都合な場合が多かつた。

本発明は、前記の如き従来のような欠点を排除したきわめて有効な防眩ミラーを提供するものである。

以下、実施例について詳細な説明をする。

第3図は本発明の防眩ミラー組立斜視図、第4図

は同発明断面図、第5図は本発明の第1実施例のブロック図である。

本発明反射ミラーは、第3図並びに第4図に示すように、透明ガラス板1、1'の片面に Fe_2O_3 又は SnO_2 を成膜法等によつて塗着して透明電極5、5'を形成し、反射ミラーの後面(入射光側側から見て)透明ガラス板1'の前記塗着面の裏面にさらば Al や Ag を塗着して高反射面6を形成する。

前記透明電極5、5'は駆動回路4に接続されるリード線4、4'が導通されている。以上の様な透明電極5、5'を形成した透明ガラス板1、1'を前記透明電極を対向するように配置し、その外面端部にガラス板または高分子フィルム等によつて形成されたスペーサ2を挟んで重ね合わせる。この時、スペーサ2はエポキシ系、アクリル系、ポリエスチル系等の接着剤によつて、エレクトロクロミック物質の出入口3を被して前記透明電極5、5'に接合固定される。その後、前記透明電極5、5'とスペーサ2によつて形成された空間にエレクトロクロミック物質を注入し、再び上記

接着剤で出入口3を封止することによつて防眩ミラーを形成する。この場合注入されるエレクトロクロミック物質としては、電圧又は電流を印加することによつて透明な状態から光透過率が0~70%程度の範囲にまで変化するようなエレクトロクロミック現象を示すために、単一物質に限られたものではなく、複数の物質によつて調成されるもので、例えば、1-1'ジアキル4-4'ビビリニウム化合物、及びその誘導体、化合物の水又は非水溶液による溶液のような、いわゆる液体エレクトロクロミック物質を用いることができる。前記の化合物の代表的な例としては、アルキル基の炭素数が1~9であるようなハロゲン化合物が挙げられる。又その他のエレクトロクロミック物質としては、 WO_3 (三酸化タングステン) MoO_3 (三酸化モリブデン) TiO_2 (二酸化チタン)等の金属酸化物と硫黄及びプロピレンカーボネート又は過塩素酸チリウム及びアシノラン等の液体電解質とを調成物質としたいわゆる半固体エレクトロクロミック物質、もしくは、前記の金属酸化物と CaF_2 (氟化

カルシウム) Cr_2O_3 (三酸化クロム) SiO (酸化珪素) SiO_2 (二酸化珪素) MgF_2 (氟化マグネシウム)等の誘導体又は固体電解質を調成物質とした全固体エレクトロクロミック物質を用いることができる。

以上のように調成された反射ミラーの透明電極5、5'に接続されたリード線4、4'は、第5図に示すようなスイッチ装置8の出力端子部へ接続され、更にスイッチ装置8の入力端子部からタイマー装置9を介して反射ミラーの光透過率を変えらるための所定の電圧又は電流を印加するための直流電圧を出力とする駆動電圧10に接続される駆動回路が接続されている。そして、前記スイッチ装置8は、その機能として2回路以上を備えているもので、駆動電圧10からの直流出力(電圧)のプラス、マイナスを必要に応じて反転することができるものである。この時エレクトロクロミック物質の光透過率を減少させる場合には、透明電極5に接続したリード線4が駆動電圧10のマイナス側と接続されるようにスイッチ装置8が設けられ

ている。尚、タイマー装置9は、第3図においては、スイッチ装置8と駆動電圧10との間に配置されているが、それらは互いに逆に配置されることも可能である。すなわち、エレクトロクロミック物質の増減等によつて反射ミラーと駆動電圧10との間の任意な位置に配置すればよい。又、タイマー装置としては0~120秒程高範囲でコントロールできる様な開閉機能を持つものを使用するのが適当である。

第6図は反射ミラーの他の実施例を示した図であつて、透明ガラス板1'の片面にA₁(アルミニウム)、A₂(銀)等の導電性を有する高反射面を逐層等により形成し、これを透明電極5の対向電極と高反射面とを兼ねる反射電極12として形成したものである。

第7図は駆動回路の他の実施例を示した図であつて、反射ミラーと駆動電圧10との間に反射ミラー側からスイッチ装置8、タイマー装置9、電圧調整装置(たとえばポリウム等の機能を有する装置)の順にそれぞれ装置を介在させた構成を有

する。尚、前述のエレクトロクロミック物質7を駆動する以前の透明率をもつようなほぼ透明な状態にする場合には、スイッチ装置8を操作して出入出力端子間の接続を切るか、若しくはスイッチ装置8の操作により透明電極5、5'の間に光透過率を減少させた時と逆向きの電圧又は電流をタイマー装置9の併用によつてタイマー制御時間だけ印加することによつて行なわれる。この時電圧調整装置11を用いれば連続的又は不連続的に元の状態にエレクトロクロミック物質を戻すことができる。

本発明は上述の如き構成、作用を有するものであるから、スイッチ装置8の操作やこれとタイマー装置9、あるいは電圧調整装置11の併用等によつて所定の電圧又は電流がこれらと時間に対応した反射光が無段階に連続的又は不連続的に得られるため光反射率が極端に低いようなことがなく、適切な防眩効果を得る。更にエレクトロクロミック物質は電圧又は電流を印加すると光吸収効果によつて光透過率を減少させる物質であり、しかも駆動時と駆動していない時のいずれも高反射面6

するものである。尚、前記装置の配列は、反射ミラーと駆動電圧10の間ではどの様な順に配置してもよい。

従つて本発明の防眩ミラー装置において、後述車のヘッドライト等からの眩光はスイッチ装置8を操作し入力端子間を接続すれば、両電極間のエレクトロクロミック物質は光透過率を減少させるため、高反射面6によつて反射する反射光は印加された所定の電圧又は電流に対応して減光される。このときタイマー装置9を同時に操作することによつて、所定の時間減光効果を得ることができ、更に駆動回路中に電圧調整装置11を介在させた場合には、前記装置を操作することによつて駆動電圧10からの所定の出力を無段階連続的に(又は不連続的に)設定することができ、両電極5、5'の印加される電圧又は電流も対応して調整され、従つてエレクトロクロミック物質の光透過率の減少も調整され、高反射面6によつて反射する反射光も無段階連続的(又は不連続的に)変化でき調整設定される。

による反射像を見るためニジミ像や重像も少なく、後方視界の視認性のよい光反射率が保持でき、夜間走行中の後方安全確認に優れている。

更に当該防眩ミラー装置は、電気的駆動であるためにスイッチ装置8等は室内ミラーに組み込むか、若しくは室内ミラー取付位置の近傍に取付けることも可能であり又、インストルメントパネル又はこの近傍に取付ければ運転者の動作を軽減できる。

又、当該防眩ミラー装置は、自動車のヘッドライトの点滅スイッチと連動してヘッドライトの点灯時には防眩ミラー装置も自動的に駆動する構成とすることによつて、スイッチ装置8の単独操作を行わずに済むほか、当該スイッチ装置8の操作忘れのため防眩ミラー装置の機能を失わせるようなこともない。

そして、本発明の防眩ミラー装置はその構成が非常に簡単のため生産設備等も小規模で済み、生産コストも安価であり、保守も容易で故障も少ないという効果を有するものである。

なお、当然のことながら、本発明は上述の実施

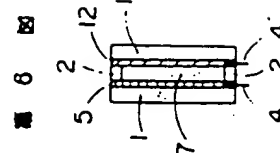
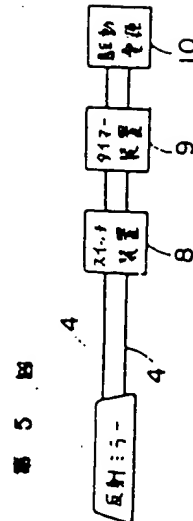
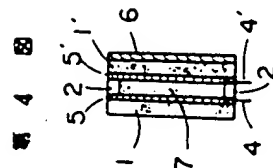
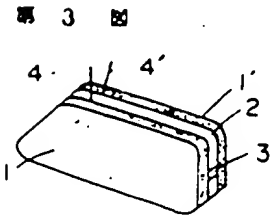
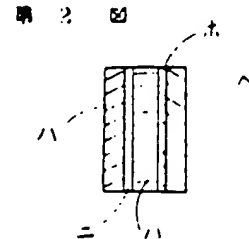
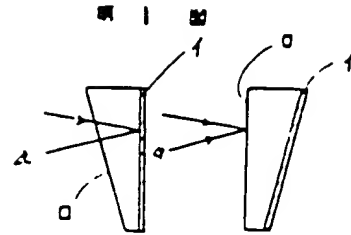
例にのみ限定されるものではない。

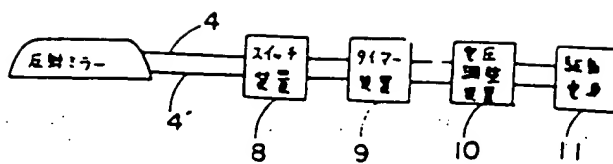
図面の簡単な説明

第1図および第2図は従来の防護シラーを示した図、第3図は本発明の防護シラーの組立て側視図、第4図は縦断面図、第5図は本発明の駆動回路の1実施例を示した図、第6図は本発明の反射シラーの他の実施例を示した断面図、第7図は駆動回路の他の実施例を示した図である。

1, 1'...透明ガラス板、4, 4'...リード線、5, 5'...透明電極、6...高反射面、7...エレクトロクロミック物質、8...スイッチ装置、9...タイマー装置、10...駆動電線、11...電圧調整装置、12...放電電極。

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